

STATE OF ALASKA

Jay S. Hammond, Governor

Annual Performance Report for

EVALUATION OF CHINOOK SALMON
FISHERIES OF THE KENAI PENINSULA

by

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ALASKA DEPARTMENT OF FISH AND GAME
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TABLE OF CONTENTS (Cont'd.)

	Page
Table 14. Bear Lake Adult Coho Salmon Enumerated Through Bear Creek Weir by Weekly Periods, 1980	25
Table 15. Marked Adult Coho Salmon Enumerated Through Bear Creek Weir by Weekly Periods, 1980	26
Table 16. Estimated Adult Return Components of Bear Lake, Bear Creek, Grouse Lake and Seward Lagoon Enhanced Coho Salmon Production from 1979 Smolt Releases	27
Table 17. Mean Fork Length and Weight of Adult Coho Salmon Sampled at Bear Creek Weir in 1980	29
Table 18. Survival of Bear Lake Coho Salmon Adults from Seaward Migrations of Smolts Fin Marked at Bear Creek Weir, 1975-1979	32
Table 19. A Summary of Hatchery Reared Coho Salmon Smolt Releases in Seward Lagoon	33
Table 20. A Summary of Hatchery Reared Coho Salmon Smolt Releases in Lower Bear Creek	34
Table 21. A Summary of Hatchery Reared Coho Salmon Smolt Releases in Grouse Lake	35

Job No. G-II-L Evaluation of Chinook Salmon Fisheries of the
Kenai Peninsula
By: Stephen L. Hammarstrom

Abstract	39
Background	40
Recommendations	40
Objectives	43
Techniques	43
Findings	44
Lower Stream Fishery	44
Deep Creek Marine Fishery	44
Kenai River Fishery	54
Discussion of Kenai River Chinook Salmon Management	63
Literature Cited	65

LIST OF FIGURES

Figure 1. Map of Lower Kenai Peninsula	41
Figure 2. Map of Central Kenai Peninsula	42
Figure 3. Chinook Salmon Catch Per Hour by Date in Deep Creek Marine Recreational Fishery, 1980	52
Figure 4. Chinook Salmon Catch Per Hour by Date for Kenai River Recreational Fishery, Downstream Section, 1980	56
Figure 5. Chinook Salmon Catch Per Hour by Date for Kenai River Recreational Fishery, Upstream Section, 1980	57

LIST OF TABLES (Cont'd.)

Page

LIST OF TABLES

Table 1.	Angler Harvest and Effort Summaries for the Chinook Salmon Fishery on the Lower Three Kenai Peninsula Streams, 1980 . . .	45
Table 2.	Historical Chinook Salmon Harvest and Effort Data from Lower Three Kenai Peninsula Streams, 1971 - 1980	46
Table 3.	Historical Harvest and Escapement for the Three Lower Kenai Peninsula Chinook Salmon Streams from 1966-1979	47
Table 4.	Length Data of Chinook Salmon Taken in the Recreational Fishery of Three Lower Kenai Peninsula Streams, 1980	48
Table 5.	Age Composition of Chinook Salmon Taken in the Recreational Harvest from Anchor River, Deep Creek, and Ninilchik River, 1980	49
Table 6.	Historical Summary of the Chinook Salmon Sport Fishery in Marine Waters off Deep Creek, 1972-1980	51
Table 7.	Summarized Data from Readable Scales Collected from Chinook Salmon Harvested in the Deep Creek Marine Fishery, 1980 . . .	53
Table 8.	Summary of Recreational Effort for, and Harvest of, Chinook Salmon on the Kenai River, 1980	55
Table 9.	Summary of Angler Effort for Chinook Salmon on the Kenai River, 1976-80	59
Table 10.	Length Frequency Data for Chinook Salmon Captured in the Kenai River, 1980	60
Table 11.	Historical Age Composition, in Percent, of Chinook Salmon Harvested from the Kenai River, 1974-1979	61
Table 12.	Historical Sport and Commercial Harvest of Kenai River Chinook Salmon, 1974-1980	62

RESEARCH PROJECT SEGMENT

State: ALASKA Name: Sport Fish Investigations of Alaska

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Job No.: G-II-L Job Title: Evaluation of Chinook Salmon Fisheries of the Kenai Peninsula

Cooperator: Stephen L. Hammarstrom

Period Covered: July 1, 1980 to June 30, 1981.

ABSTRACT

The 4-weekend fishery for chinook salmon, Oncorhynchus tshawytscha (Walbaum), on Anchor River, Deep Creek and Ninilchik River is discussed. Total angler effort, 28,787 man-days, was estimated by vehicle counts on location. Total harvest, 994 fish longer than 51 centimeters (20 inches), was derived by creel census. Punch cards were required in 1980, but were not required to be returned until December 31. Harvest estimates of chinook salmon as determined by creel census were: Anchor River, 425; Deep Creek, 90; and Ninilchik River, 480.

Age structure as determined by analysis of scale samples collected from the recreational fishery is discussed. The predominant age class was 1.3 (brood year 1975).

The 1980 saltwater chinook salmon fishery in Cook Inlet, south of Deep Creek, was monitored by creel census. Harvests from both early and late runs were 521 and 747 respectively. Total angler effort was 17,169 man-days. Estimates were calculated on the basis of 4,031 angler interviews, 300 creel-checked fish and 180 instantaneous boat counts. Historical data for this fishery are presented.

Age composition of fish taken in the saltwater fishery was based on 54 readable scales collected during the fishery. Both early and late runs showed a domination of Age class 1.4, 72.8 and 71.9 percent, respectively. Fish from the late run averaged 22.5 kilograms (49.5 pounds) each.

For the seventh year, the Kenai River chinook salmon fishery was monitored by creel census. In 1980, data from 10,087 angler interviews, 464 creel-checked fish, 167 instantaneous angler counts and 20 aerial surveys provided the basis for an estimated effort of 70,625 man-days and a harvest of 5,554 fish over 51 centimeters (20 inches), 1,946 from the early run and 3,608 from the late run.

Sampling of the Kenai River recreational fishery produced 177 readable chinook salmon scales for age analysis. The predominant age class was 1.4 for both runs.

The results of the second year of a tagging study to determine the total escapement of chinook salmon into the Kenai River were very encouraging. Although no estimates were achieved, this program will be continued in the future, as many of the logistical and technical problems were solved during 1980 and a more efficient capture method will be available in 1981.

BACKGROUND

Chinook salmon are the most desired species by sport anglers on the Kenai Peninsula. Initially, harvest was concentrated on the southern streams of Anchor River, Deep Creek and Ninilchik River (Figure 1). Management on these streams have ranged from unregulated fisheries to complete closures and, from 1966 until 1980 (except 1978), a punch card was utilized as a management tool. During 1978, only a daily bag and possession limit was required.

Pertinent historical data regarding this fishery are presented in Reports of Progress by Dunn (1961); Logan (1962, 1963, 1964); Engel & Logan (1965, 1966); Engel (1967); Redick (1968); McHenry (1969); Watsjold (1970); Nelson (1971, 1972a, 1972b); and Hammarstrom (1974, 1975, 1976, 1977, 1978, 1979, 1980).

In 1972 anglers discovered chinook salmon could be harvested in the marine waters of Cook Inlet in the vicinity of Deep Creek, as they move through this area in two apparent runs, early and late. Early run fish (mid-May to mid-June) probably are bound for many systems in Cook Inlet but are heavily influenced by runs to the Kenai and Kasilof Rivers. Late run fish, mid-June through July, are bound almost entirely for the Kenai River. Harvest and effort have been monitored by creel census since 1972. Fluctuation in harvest and effort are more a function of local weather conditions than they are of abundance of fish. Historical data pertaining to this fishery are presented by Hammarstrom (1974, 1975, 1976, 1977, 1978, 1979, 1980).

The Kenai River (Figure 2) became popular for chinook salmon in 1973. In 1974, the Department of Fish and Game initiated a creel census to monitor harvest and effort. That census was expanded in 1975 and has been continued each summer since. For the past 5 years, angling effort for chinook salmon on the Kenai River has made this the largest fishery in Alaska. Historical data are presented in reports by Hammarstrom (1975, 1976, 1977, 1978, 1979, 1980).

RECOMMENDATIONS

1. Escapement of chinook salmon into the Kenai River system should be assessed.

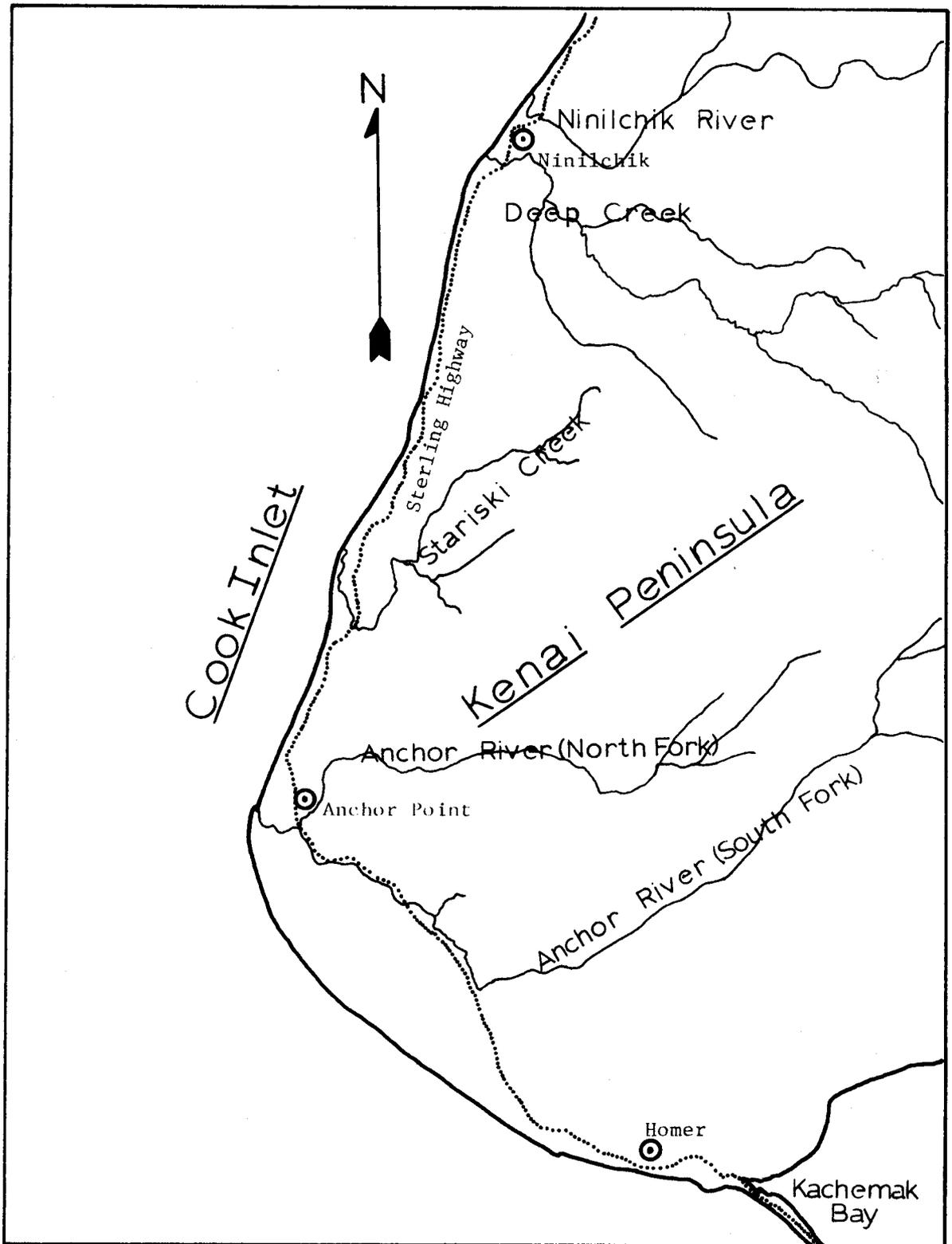


Fig. 1 Map of Lower Kenai Peninsula.

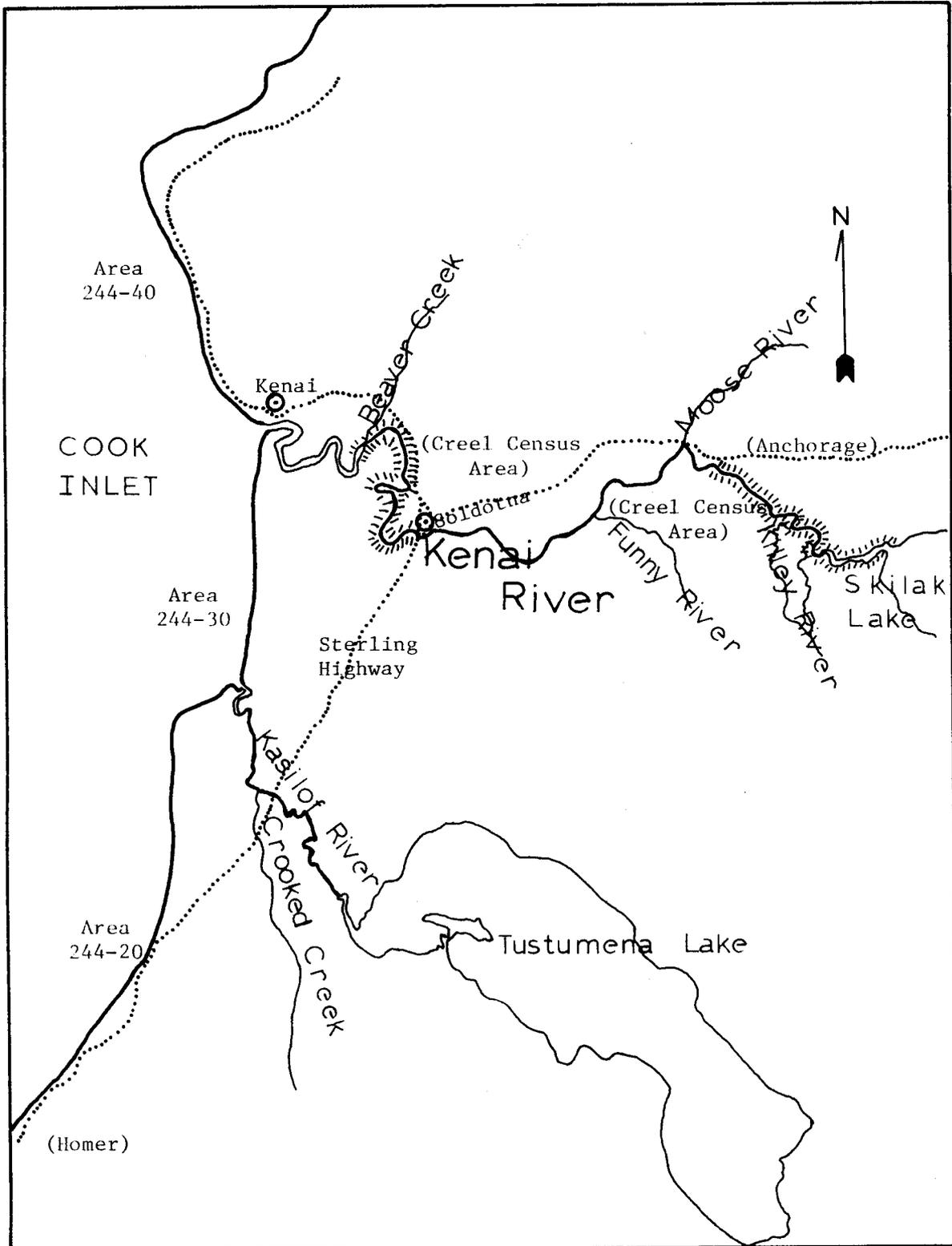


Fig. 2. Map of Central Kenai Peninsula.

2. Possibilities of determining racial separation of early run chinook salmon harvested in salt water should be explored.

OBJECTIVES

1. To determine the sport harvest of chinook salmon and evaluate angler pressure in the Kenai Peninsula area.
2. To determine spawning escapement into the major chinook salmon producing streams in the area.
3. To determine chinook salmon population trends in the major recreational waters of the Kenai Peninsula.
4. To determine and develop plans for the enhancement of chinook salmon stocks, to provide recommendations for their management and to direct the course of future studies.

TECHNIQUES

During 1980, a punch card was required for chinook salmon in the Cook Inlet area. Because these cards were not required to be returned until December 31, 1980, no information was available at this writing.

Harvest, effort and escapement estimates on the three streams, Anchor River, Deep Creek and Ninilchik River, were compiled using the same methods as those described by Hammarstrom (1978, 1979).

Techniques utilized on the Kenai River and the Deep Creek marine fisheries were as described by Hammarstrom (1977).

A cooperative project with the United States Fish and Wildlife Service was designed to tag and release returning chinook salmon in the Kenai River. Adult chinook salmon were captured by drifting a gill net in the lower 10 miles of the Kenai River, usually in intertidal waters downstream from the very active sport fishery (Hammarstrom, 1980).

Problems encountered with various capture devices in 1979 led to the use of commercial set net gear as the primary means of capture. Short lengths, up to 7.6 meters (25 feet) of 136 mm (5-3.8 inch) stretched mesh were drifted perpendicular to the current behind a 5.5 meter (18 foot) riverboat. Immediately upon noticing a fish in the net, it was retrieved and the fish put in a holding tank or tagged and released.

Both radio transmitters and numbered Peterson disc tags were used. The telemetry gear was provided by the U.S. Fish and Wildlife Service and was to be used to determine migrational timing and behavior. The disc tags were used for a population estimate.

FINDINGS

Lower Stream Fishery

The 1980 spring fishery for chinook salmon on Anchor River, Deep Creek and Ninilchik River was conducted under similar regulations as in 1978 and 1979. Each stream was open the last weekend in May and the first 3 weekends of June, except Ninilchik River, which was closed after the second weekend of June. Each weekend included Saturday, Sunday and Monday. Harvest for this entire fishery was estimated at 955 chinook salmon over 51 cm (20 inches) and effort was estimated at 28,787 man-days. A man-day was approximately 4.0 hours.

Stream conditions, poor catch rates in the streams and relatively few fish showing in the adjacent marine fishery indicated a weaker run than had occurred in the last few years. Also, no additional fishing time was granted as had been the case in 1978 and 1979.

Ninilchik River, which was the more fishable during the first 2 weekends, produced the most fish. The Anchor River did not clear until the last weekend and the catch (Table 1) reflects this. Deep Creek was not fishable until the last weekend and was then only marginal. Historical data are presented in Table 2.

Escapement surveys were attempted during the first week of August. Weather conditions during the summer of 1980 were extremely wet and the sky remained overcast. The surveys were attempted on the only sunny days that occurred during the spawning period. Stream conditions were high and visibility was reduced by the amount of water. Except in the shallowest riffles fish were not readily identifiable. The author feels that the resultant counts were not accurate enough to truly represent numbers of fish in the stream. Based on the number of fish that were actually observed and the carcasses seen, it is felt escapement was adequate. Escapement numbers listed in Table 3 are considered less than minimum values.

Just prior to freeze-up, heavy rains caused the Anchor River and Deep Creek to leave their banks. Many changes occurred to the stream bed during this period and the resultant damage, if any, to the incubating spawn will manifest itself during the returns of 1984, 1985 and 1986.

During 1980, a total of 250 readable scales were collected from sport-caught chinook salmon from the three streams. Age class 1.3 (brood year 1975) represented 45.2% of the harvest while Age class 1.4 (brood year 1974) represented 43.6% of the harvest. Age class data are presented in Table 4 and 5.

Deep Creek Marine Fishery

In 1980, the creel census was operated to measure angler harvest and effort for chinook salmon in the marine waters off Deep Creek. The fishery commenced May 12 and was continuous through July 31.

Table 1. Angler Harvest and Effort Summaries for the Chinook Salmon Fishery on the Lower Klamath Peninsula Streams, 1980.

Date	Anchor River		Deep Creek		Ninilchik River		Total	
	Harvest	Effort	Harvest	Effort	Harvest	Effort	Harvest	Effort
5/24	35	1,782	0	615	150	2,337	185	4,734
5/25	20	1,531	10	500	35	2,424	65	4,455
5/26	15	661	0	733	25	1,113	40	2,507
Subtotal	70	3,974	10	1,848	210	5,874	290	11,696
5/31	25	456	0	612	45	1,558	70	2,626
6/1	15	433	0	528	70	1,372	85	2,333
6/2	25	247	0	264	30	464	55	975
Subtotal	65	1,136	0	1,404	145	3,394	210	5,934
6/7	35	973	0	261	85	1,835	120	3,069
6/8	20	878	0	120	25	1,699	45	2,697
6/9	40	357	0	119	15	616	55	1,092
Subtotal	95	2,208	0	500	125	4,150	220	6,858
6/14	120	1,292	20	662			140	1,954
6/15	45	1,034	35	429			80	1,463
6/16	30	465	25	417			55	882
Subtotal	195	2,791	80	1,508			275	4,299
Grand total	425	10,109	90	5,260	480	13,418	995	28,787

Table 2. Historical Chinook Salmon Harvest and Effort Data from Lower Three Kenai Peninsula Streams, 1971-1980.

Year	Effort (man-days)	Harvest	Length of Season (days)	Average Effort/Day	Average Harvest/Day	Man-Days Per Fish
1971	15,900	240	6	2,650	40	66
1972	13,520	490	4	3,380	123	28
1973	24,100	770	6	4,017	128	31
1974	21,000	1,080	6	3,500	180	19
1975	19,600	850	6	3,267	142	23
1976	36,920	1,680	8	4,615	210	22
1977	24,520	2,170	8	3,065	271	11
1978	45,540	3,400	16*	2,846	283	13
1979	36,640	2,100	16*	2,290	175	17
1980	28,787	995	12	2,399	83	29
Mean	26,653	1,380	8.8	3,030	157	19

Table 3. Historical Harvest and Escapement for the Three Lower Kenai Peninsula Chinook Salmon Streams from 1966-1979.

Year	Anchor River			Deep Creek			Ninilchik River			Total		
	Harvest	Escapement	% Harvest*	Harvest	Escapement	% Harvest*	Harvest	Escapement	% Harvest*	Harvest	Escapement	Run
1966	290	1,330	18	50	540	9	200	670	25	560	2,540	3,100
1967	240	1,200	17	180	270	40	120	360	25	540	1,830	2,370
1968	250	530	32	160	200	44	210	450	32	620	1,180	1,800
1969	80	1,800	4	40	960	4	130	760	15	250	3,520	3,770
1970	170	1,850	8	60	...	...	280	...	...	510	1,850+	2,360+
1971	60	1,220	5	40	...	...	140	...	...	240	1,220+	1,460+
1972	180	1,890	9	140	530	21	170	1,360	11	490	3,780	4,270
1973	330	1,660	17	140	220	39	300	640	32	770	2,520	3,290
1974	440	1,000	31	290	740	28	350	510	41	1,080	2,250	3,330
1975	210	1,290	14	100	610	14	540	830	39	850	2,730	3,580
1976	830	3,080	21	220	1,680	12	630	1,180	35	1,680	5,940	7,620
1977	1,020	4,170	16	240	990	21	910	1,400	40	2,170	6,560	8,730
1978	1,680	2,410	41	590	1,010	40	1,130	990	44	3,400	4,410	7,810
1979	1,030	2,000	34	370	1,750	17	700	1,390	34	2,100	5,140	7,240
Mean (excludes all 1970 and 1971 data)												
1966-79	545	1,870	23	215	790	21	455	885	34	1,215	3,545	4,760
1980**	425	2,675	39	90	1,475	16	480	1,715	40	995	1,865	2,860

Figures rounded to nearest 10.

* % of total run harvested.

** Escapement count considered minimal due to high turbid water during entire summer.

Table 4. Length Data (mid-eye to fork of tail) of Chinook Salmon Taken in the Recreational Fishery of Three Lower Kenai Peninsula Streams, 1980.

	Age Class		
	<u>1.2</u>	<u>1.3</u>	<u>1.4</u>
<u>Anchor River</u>			
Number	13	49	40
Range (mm)	540-660	670-890	765-1060
Mean (mm)	614.0	770.5	860.7
S.D.*	35.1	49.9	136.9
<u>Ninilchik River</u>			
Number	15	82	64
Range (mm)	460-640	650-860	775-990
Mean (mm)	543.9	769.0	880.1
S.D.*	49.9	45.2	50.2
<u>Deep Creek</u>			
Number	0	2	6
Range (mm)	...	785-790	865-960
Mean (mm)	...	787.5	902.5
S.D.*	...	3.5	40.2
<u>Total</u>			
Number	28	133	110
Range (mm)	460-660	650-890	765-1060
Mean (mm)	576.5	769.8	874.5
S.D.*	55.7	46.5	91.5

* S.D. - Standard Deviation

Table 5. Age Composition of Chinook Salmon Taken in the Recreational Harvest from Anchor River, Deep Creek, and Ninilchik River, 1980.

	Age Class					Total
	1.2	1.3	1.4	1.5	Other	
Number	28	113	109			250
Percent	11.2	45.2	43.6			100.0
	Brood Year			1974	Total	
	1976	1975				
Number	28	113	109	250		
Percent	11.2	45.2	43.6	100.0		

The season ran for 81 days and creel census activities were conducted on 54 days (67%). During the census days, 10 were recorded as weather days when no boats were launched and 9 were so rough that less than five boats were able to fish. Thus the season was effectively reduced by 29 days (35%). The remaining 52 days were marred by whitecapping seas, fog and rain. In addition, the turbid waters of Cook Inlet, which normally extend south only as far as Ninilchik, extended almost to Stariski Creek during the summer of 1980. Many anglers stated they felt that the combination of stormy weather, rain and turbid water conditions affected the fish in that they refused to strike.

During 1980, 156 instantaneous boat counts were conducted; 3,600 boats were present, 4,031 anglers were interviewed in a total of 1,527 boats, 299 chinook salmon were creel-checked and 15,662 angler hours were reported. These figures were used to arrive at the following seasonal estimates: effort - 17,169 man-days; harvest - 1,268 chinook salmon.

Since 1973, the early run (mid-May through late June) has attracted the majority of anglers and produced the majority of the harvest. This year, 1980, differed in that more effort was exerted during the late run. Weather was the most significant factor in the apparent decline in popularity. Early run fish were available through June 29 for a total of 49 days. Fifteen of those were regarded as weather days. Thus harvest was estimated at 521 and effort was estimated at 8,065 man-days.

Corresponding figures for the late run are an estimated harvest of 747 chinook salmon by 9,104 man-days of effort.

The average (1972-1979) time required to capture a chinook salmon in this fishery has been 15 hours. In 1980, it required nearly 43 hours to capture one fish. Catch per hour dropped in the early run from a mean of .066 to .017 in 1980 and for the late run from .073 to .021.

Table 6 presents a historical summary of the fishery while Figure 3 depicts the timing of the 1980 return as determined by recreational harvest rates.

During the 1980 season, 56 readable scales were collected from the sport harvest. The majority, in both early and late runs, was Age class 1.4 (brood year 1974). This age class represented 70.8% of the early run and 71.9% of the late run. Summarized age and length data are presented in Table 7.

It is interesting to note that one particular scale taken from a 1,200 mm (mid-eye fork of tail) male weighing 34.6 kg was aged as a 0.6. This is the first time a chinook salmon without a period of freshwater residency has been identified from the east side of Cook Inlet and it is presumed to have originated from the Crooked Creek Hatchery. Sex ratio of the harvest during both runs was 0.8:1 males to females.

Table 6. Historical Summary of the Chinook Salmon Sport Fishery in Marine Waters off Deep Creek, 1972-1980.

Year	Early Run			Late Run			Total		
	Harvest	Effort Man-Days	Catch/ Hour	Harvest	Effort Man-Days	Catch/ Hour	Harvest	Effort Man-Days	Catch/ Hour
1972	1,000	2,357	0.119	1,250	1,253	0.272	2,250	3,610	0.173
1973	519	5,245	0.028	491	2,795	0.050	1,010	8,040	0.034
1974	500	3,810	0.037	100	1,280	0.034	600	5,090	0.036
1975	540	3,370	0.061	345	4,680	0.031	885	8,050	0.044
1976	5,495	12,268	0.101	1,382	6,365	0.057	6,877	16,635	0.088
1977	4,617	18,803	0.069	366	6,938	0.017	4,983	25,741	0.056
1978	2,669	14,413	0.059	2,693	9,402	0.081	5,362	23,815	0.068
1979	3,088	13,352	0.053	1,164	8,728	0.034	4,252	22,080	0.046
Mean									
1972-79	2,304	9,201	0.066	975	5,180	0.073	3,279	14,381	0.068
1980	521	8,065	0.017	747	9,104	0.021	1,268	17,169	0.019

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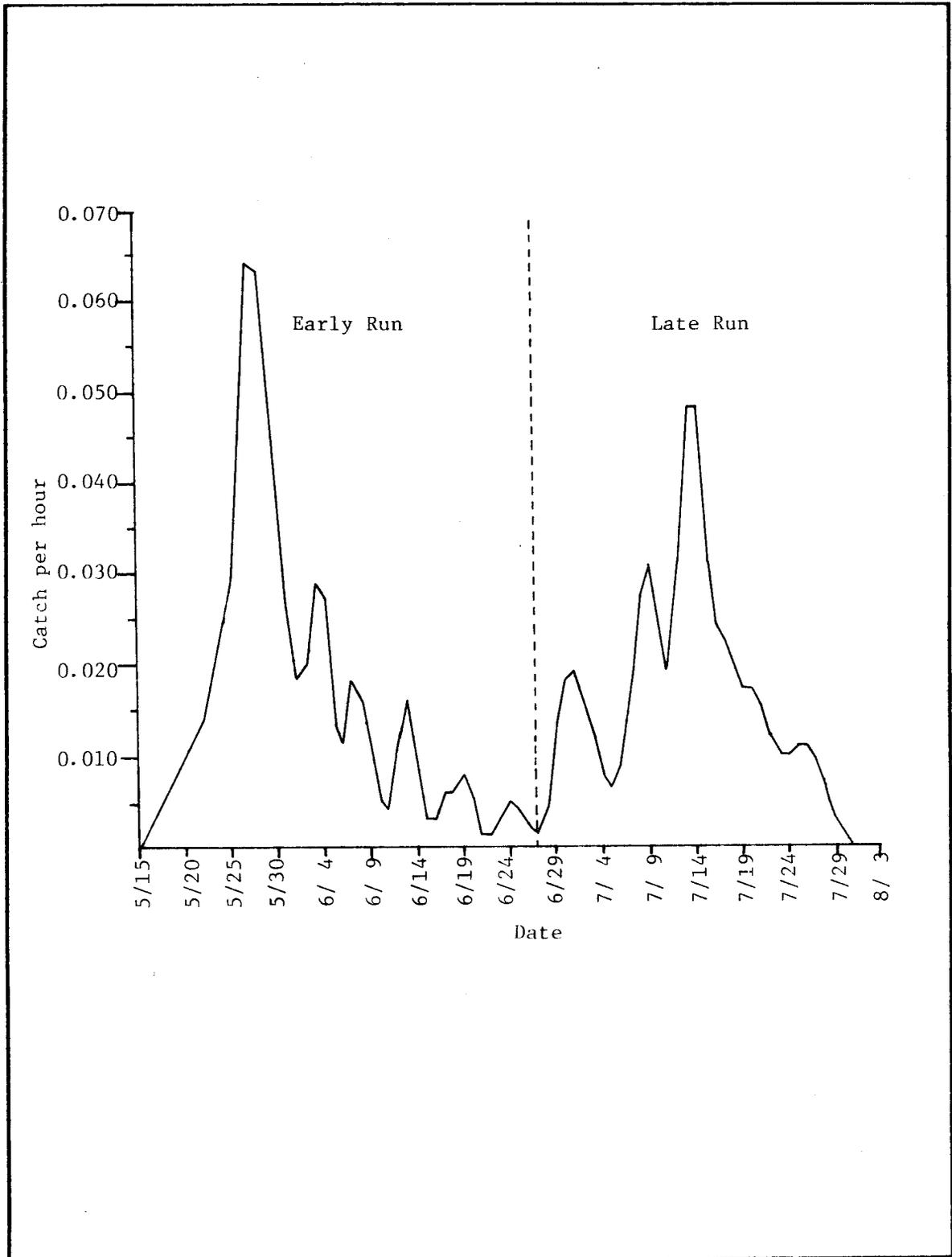


Fig. 3. Chinook Salmon Catch Per Hour by Date in Deep Creek Marine Recreational Fishery, 1980 (graph smoothed by $\frac{a+2b+c}{4}$).

Table 7. Summarized data from Readable Scales Collected from Chinook Salmon Harvested in the Deep Creek Marine Fishery, 1980.

Age Class	1.2	1.3	1.4	1.5	Total
Brood Year	1976	1975	1974	1973	
<u>Early Run</u>					
Number	1	5	16	...	22
Percent	4.5	22.7	72.8		100.0
Length Range*(mm)	520	740-880	790-1165		520-1165
Mean*(mm)	502.0	790	962		903
Mean Weight (kg)	3.0	8.7	17.3		15.4
<u>Late Run</u>					
Number	0	4	23	5	32
Percent	...	12.5	71.9	15.6	100.0
Length Range*(mm)	...	840-930	900-1170	980-1220	840-1220
Mean*(mm)	...	886	1065	1110	1049
Mean Weight (kg)	...	14.0	22.2	28.8	22.5

* Mid-eye to fork of tail.

Kenai River Fishery

The creel census of chinook salmon anglers on the Kenai River commenced June 1, 1980, and was continuous through July 31. During that time, 167 instantaneous angler counts were made; 15,052 anglers were enumerated; 10,087 anglers were interviewed; 20 aerial surveys were conducted; and 464 chinook salmon over 508 mm total length were creel-checked.

The run into the Kenai River is comprised of two segments, early and late. Because of the distance traveled and the characteristic behavior of the migration, timing in each segment of the river differs.

During 1980, early run fish were available in the lower section of the river (Beaver Creek to Soldotna Bridge) from June 1 through July 4, and in the upstream section (Naptowne Rapids to Skilak Lake) from June 1 through July 11. Late run fish were available in each section from the end of the early run through July 31 when the season closed by regulation. Timing dates were assigned by analyzing catch rates then adjusting to nearest weekly period - in this case, Friday. Since the two runs overlap, assigning a date for separation is for convenience in meeting the requirements prescribed by the Board of Fisheries in managing the late run.

Total early run harvest was estimated at 1,946 chinook salmon and effort was estimated at 32,365 man-days. The majority of the fish were harvested in the downstream section (Table 8). During the beginning of the early run, the waters of the Kenai River were more turbid than normal, which anglers blamed for the reluctance of fish to strike. The common technique of drifting produced poor results. Consequently anglers discovered fish were more readily taken by remaining stationary above a hole and working a diving lure through the hole. The "hot-shot" was one of the more productive lures. It took anglers about 3 weeks to develop this technique. The peak of the run had already passed in the lower river section by the time anglers were becoming successful. This allowed more fish into the middle and upper river areas and thus their harvest was proportionately better than had occurred the last 5 years.

Late run harvest was estimated at 3,608 chinook salmon and effort was estimated at 38,260 man-days. The late run was about 10 days later than normal entering the river. They appeared to move into the upper section quicker than normally but still that area had only 20 days to fish the stocks. The peak occurred quite late in July and the resultant upstream harvest was quite low. Timing of fish moving through each section as determined by recreational harvest rates is depicted in Figures 4 and 5.

The total effort was reduced by 27,935 man-days an apparent drop of 28%. However, because fishing was quite poor by recent standards, the average angler stayed out longer each day. In 1979, an average angler day was 3.6 man-hours. In 1980 the average day jumped to 4.5 man-hours. Thus in actuality there was only a 10% (37,000 man-hour) reduction in total effort.

Table 8. Summary of Recreational Effort for, and Harvest of, Chinook Salmon (over 20 inches) on the Kenai River, 1980.

	Downstream Section	Midstream Section	Upstream Section	Shore	Total
		<u>Early Run</u>			
Effort (man-days)	17,530	4,620	6,663	3,552	32,365
Harvest	1,070	290	465	121	1,946
		<u>Late Run</u>			
Effort (man-days)	23,401	5,311	6,742	2,806	38,260
Harvest	2,483	515	242	368	3,608
		<u>Both Runs</u>			
Effort (man-days)	40,931	9,931	13,405	6,358	70,625
Harvest	3,553	805	707	489	5,554
Percent Effort	58.0	14.1	19.0	8.9	100.0
Percent Harvest	64.0	14.5	12.7	8.8	100.0

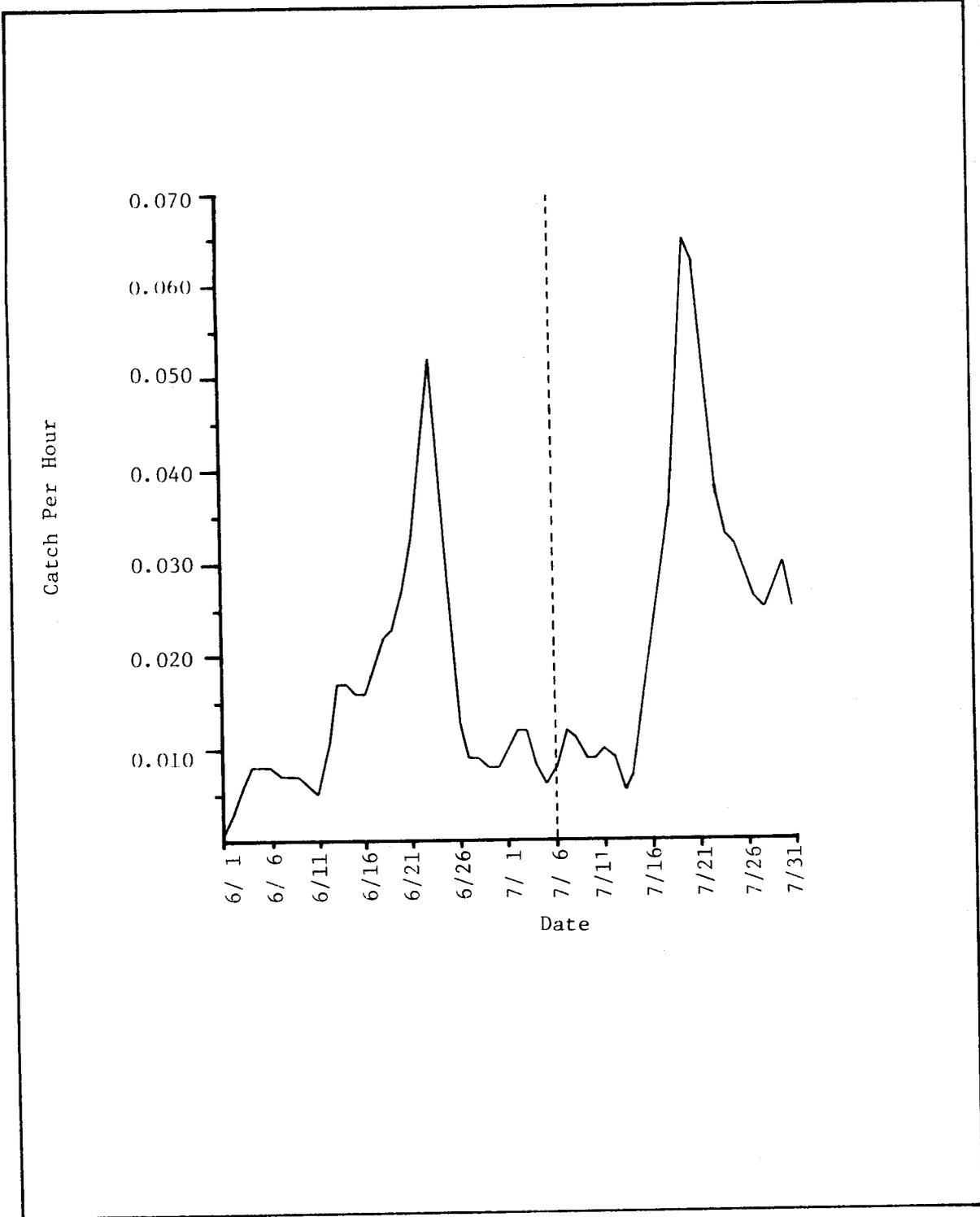


Fig. 4. Chinook Salmon Catch Per Hour by Date for Kenai River Recreational Fishery, Downstream Section, 1980 (graph smoothed by $\frac{a+b+c}{4}$).

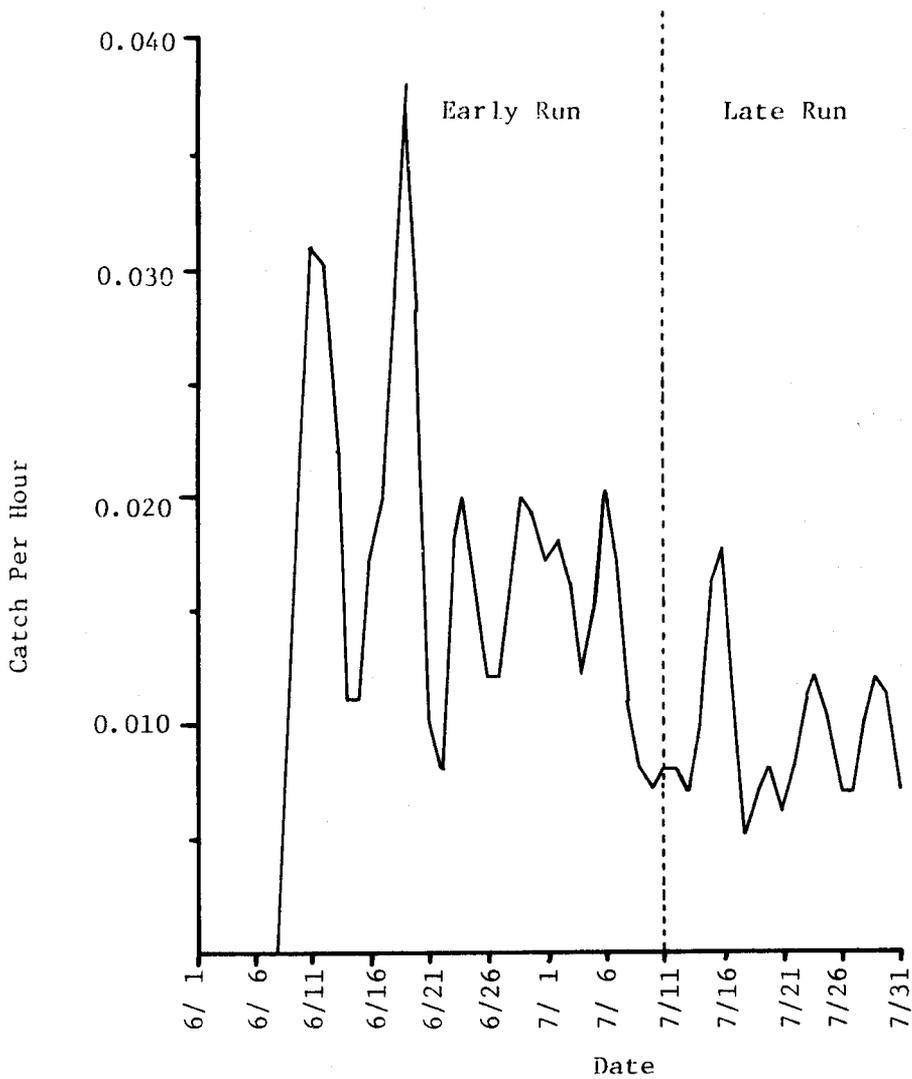


Fig. 5. Chinook Salmon Catch Per Hour by Date for Kenai River Recreational Fishery, Upstream Section, 1980 (graph smoothed by $\frac{a+2b+c}{4}$).

Total harvest dropped from 8,275 to 5,554 chinook salmon, a reduction of 33%. It took an average of 45 man-hours in 1979 to catch a chinook salmon, while in 1980 it took an average of 59 man-hours or a 31% increase in time. Catch per hour during the early run averaged .010 and 0.18 for the late run. Historical data for this fishery are presented in Table 9.

In past reports (Hammarstrom 1974-1980), estimates for the harvest of Age class 1.1 (jacks) were made. These were based partially on information collected in the creel census of boat anglers and a survey of shore anglers done in 1975. Increased runs of sockeye salmon, and the apparent increase in the importance of sport-caught fish to the diet of local anglers has changed the nature of the shore fishery. Thus it is felt that the data gathered in 1975 can no longer be assumed to adequately represent that portion of the fishery.

A carcass count was made in early September and 1,138 chinook salmon carcasses were identified from the Soldotna Bridge to Beaver Creek and another 625 from Skilak Lake to Naptowne Rapids. These were felt to be primarily late run fish. Thus there was a minimum of 1,763 late run fish that spawned. Although this is not a significant number compared to the harvest, it is reasonable to assume these carcasses were only a minor part of the total spawning population.

During June and July, readable scales were collected from 502 chinook salmon; 225 during the early run and 277 during the late run. The predominant age class during both runs was 1.4 (brood year 1974), 68.9% and 50.2% early and late runs, respectively. Table 10 presents age composition data. Most fish harvested were males and the sex ratio was 1:1.6 males to females. Thus the projected harvest was 3,430 males and 2,122 females. Historical age composition is described in Table 11.

The requirements of a policy adopted by the Board of Fisheries in 1975 (Hammarstrom, 1977), were complied with this year and, thus, no closures resulted. Basically, the policy requires that the recreational fisheries off Deep Creek and in the Kenai River share the late run chinook salmon with Cook Inlet's east side commercial set nets on a one-to-one basis, not to exceed 10% greater harvest by sport fishermen, based on the regularly scheduled two 12-hour commercial periods per week. The combined recreational harvest was 4,355 while the commercial harvest during the regular periods was 5,378. Historical comparison of the recreational and commercial harvests is presented in Table 12.

A program proposed in 1975 to determine the total spawning population of chinook salmon into the Kenai River (Hammarstrom, 1977) will produce the first year's data during the 1981 field season. The monies were appropriated in 1979 and a bid was approved in 1980 for construction of a floating fish trap. The facility is scheduled to be on site in April 1981. The first year will undoubtedly be used to perfect collection techniques with the new trap, find the best location to capture chinook salmon most efficiently and, in general, work the "bugs" out of it.

Year	Effort in Man-Days									
	Upstream		Mid-Stream		Downstream		Shore		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
1976	8,331	18.7	5,644	12.7	23,536	52.9	6,949	15.7	44,460	100.0
1977	15,766	19.0	5,812	7.0	47,659	57.4	13,781	16.6	83,018	100.0
1978	14,807	18.5	5,533	6.8	46,498	58.0	13,364	16.7	80,202	100.0
1979	14,845	15.1	7,405	7.5	67,250	68.3	9,060	9.1	98,560	100.0
1980	13,405	19.0	9,931	14.0	40,931	58.0	6,358	9.0	70,625	100.0
Mean	13,432	17.8	6,866	9.2	45,175	59.9	9,902	13.1	75,373	100.0

Table 10. Length Frequency Data for Chinook Salmon Captured in the Kenai River, 1980.

Age Class	1.2	1.3	1.4	1.5	Total
<u>Early Run</u>					
Number	20	33	155	14	222
Percent	9.0	14.9	69.8	6.3	100.0
Length Range*(mm)	520-725	570-990	775-1190	1015-1220	520-1220
Mean Length*(mm)	598.8	804.7	1008.5	1101.6	948.2
Mean Weight (kg)	4.6	8.0	18.4	25.0	16.1
<u>Late Run</u>					
Number	59	60	139	21	279
Percent	21.1	21.5	49.9	7.5	100.0
Length Range*(mm)	540-740	620-835	890-1210	980-1230	540-1230
Mean Length*(mm)	626.0	810.0	1043.8	1143.8	910.0
Mean Weight (kg)	6.2	10.5	24.0	24.8	17.4
<u>Both Runs</u>					
Number	79	93	294	35	501
Percent	15.7	18.6	58.7	7.0	100.0
Length Range*(mm)	520-740	570-990	775-1210	980-1230	520-1230
Mean Length*(mm)	618.7	808.0	1025.0	1120.5	928.2
Mean Weight (kg)	5.8	9.6	21.0	24.9	16.8

* Mid-eye to fork of tail.

Table 11. Historical Age Composition, in Percent, of Chinook Salmon Harvested from the Kenai River, 1974-1979.

Investment	Age Class			
	1.2	1.3	1.4	1.5
<u>July Run</u>				
6	27.8	25.3	44.3	2.6
7	14.4	30.3	53.7	1.5
8	15.9	18.8	65.3	0
9	5.8	30.8	51.9	11.5
0	9.0	14.9	69.8	6.3
n	14.6	24.0	57.0	4.4
<u>September Run</u>				
6	30.4	20.5	45.1	4.0
7	11.6	41.6	45.0	1.7
8	12.6	8.0	77.7	1.7
9	15.1	17.8	54.8	12.3
0	21.1	21.5	49.7	7.5
n	18.2	21.9	54.5	5.4
<u>Total Both Runs</u>				
4	5.9	4.7	83.5	5.9
5	44.5	32.5	20.0	3.0
6	29.3	22.5	44.8	3.4
7	12.9	35.0	48.9	1.6
8	13.5	11.1	74.2	1.2
9	9.6	25.4	53.1	11.9
0	15.7	18.6	58.7	7.0
n	18.8	21.4	54.7	4.9

Table 12. Historical Sport and Commercial Harvest of Kenai River Chinook Salmon, 1974-1980.

Year	Deep Creek Marine	(244-20, 30, 40) Commercial Set Net	Kenai River	Total
<u>Early Run</u>				
1974	500	211	1,685	2,396
1975	540	185	615	1,340
1976	5,495	876	1,554	7,925
1977	4,617	1,075	2,173	7,865
1978	2,669	858	1,542	5,069
1979	3,088	1,062	3,661	7,811
1980	521	663	1,946	3,130
Mean	2,490	704	1,882	5,076
<u>Late Run</u>				
1974	100	5,404	3,225	8,729
1975	345	3,497	2,355	6,197
1976	1,382	7,361	4,477	13,220
1977	366	7,631	5,148	13,145
1978	2,693	10,786	5,578	19,057
1979	1,164	6,840	4,634	12,638
1980	747	8,055	3,608	12,410
Mean	971	7,082	4,146	12,199
<u>Both Runs</u>				
1974	600	5,615	4,910	11,125
1975	885	3,682	2,970	7,537
1976	6,877	8,237	6,031	21,145
1977	4,983	8,706	7,321	21,010
1978	5,362	11,644	7,120	24,126
1979	4,252	7,902	8,295	20,449
1980	1,268	8,718	5,554	15,540
Mean	3,461	7,786	6,029	17,276

For the second year, chinook salmon were captured below the recreational fishery in the Kenai River, tagged and released. Both radio tags and "Peterson disc" tags were used. During the early run, 117 chinook salmon were tagged and released, 21 with both radio tags and disc tags and 96 with disc tags only. Of these only six were recaptured, one of which was in a commercial set net south of the river's mouth. The remainder were taken in the sport fishery in the river. Not enough fish were tagged to make a population estimate.

It appears the majority of the early run utilizes the Killey River system. Of the 21 radio tags released, 14 were followed to the Killey River or its tributaries, another two went off the air just downstream from the Killey River. The detailed information gathered in this radio tagging experiment will be presented in a report authored by Carl Berger of the U.S. Fish and Wildlife Service.

During the late run, 277 tags were placed on chinook salmon. Of these, six were recovered in the sport fishery, one was recovered in a commercial set net just north of the mouth of the river and two were found on spawned out carcasses. Again, not enough fish were tagged to obtain an accurate population estimate.

Discussion of Kenai River Chinook Salmon Management

Late run chinook salmon in the Kenai River have been managed according to a policy adopted by the Board of Fisheries in 1975. There were a few assumptions made at that time which have changed; consequently, the Board has made changes in its policy regarding late run fish. They have also included the early run fish in a policy.

The early run policy has been adopted to incorporate the planned subsistence fishery in May and June of 1981. The specific limits have not been set, but it appears that, based on the size of the subsistence take, the first to be restricted would be the commercial set net fishery along the east side beaches. If further restrictions are necessary to protect the escapement, then the recreational fishery in the Kenai River will be affected.

The policy was established at the request of the staff to ensure the total harvest was kept within historical limits, especially since very little data are available other than harvest and effort. Now that the fish trap will be in operation, maybe some of the needed data can be obtained.

The late run chinook salmon policy stated the fish would be shared equally between sport and commercial users based on the harvest taken during the regularly scheduled two 12-hour periods per week in statistical areas 244-20, 30, 40.

Chinook salmon are harvested incidental to sockeye salmon in Cook Inlet, and when the policy was adopted, sockeye salmon management had not advanced to the point it is today. Returns were expected to be cyclic and addi-

tional fishing time would be the exception rather than the rule. Through restrictions on fishing time, the escapement ranges established for the Kenai and Kasilof Rivers have been achieved over the last 5 years. Returns of sockeye salmon are expected to be good over the next 5 years and probably will require substantial additional commercial fishing time to keep from exceeding the upper limits of these established ranges. Most of the additional time will be granted to the set net fishery around the Kenai-Kasilof Rivers (areas 244-20, 30, 40). Additional chinook salmon will also be harvested, but the policy had previously ignored these additional fish.

The new policy adopted by the Board of Fisheries will reduce the allowable sport harvest of chinook salmon in the Kenai River by the same number of fish harvested during additional commercial periods in areas 244-20, 30, 40. It will probably mean minor closures over the next 5 years in the recreational fishery in the Kenai River. Also, the recreational fishery off Deep Creek has been eliminated from the policy.

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